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CORROSIVE FLUID CONTAINER FITTING

Filed June 25, 1958

Fig. 1.

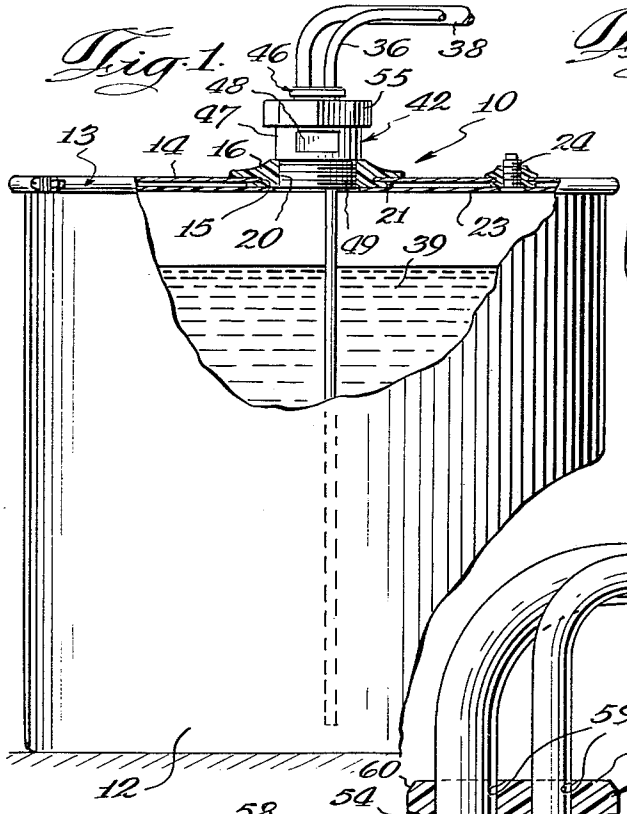


Fig. 3.

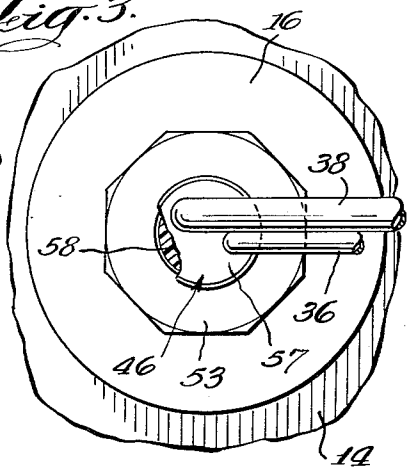
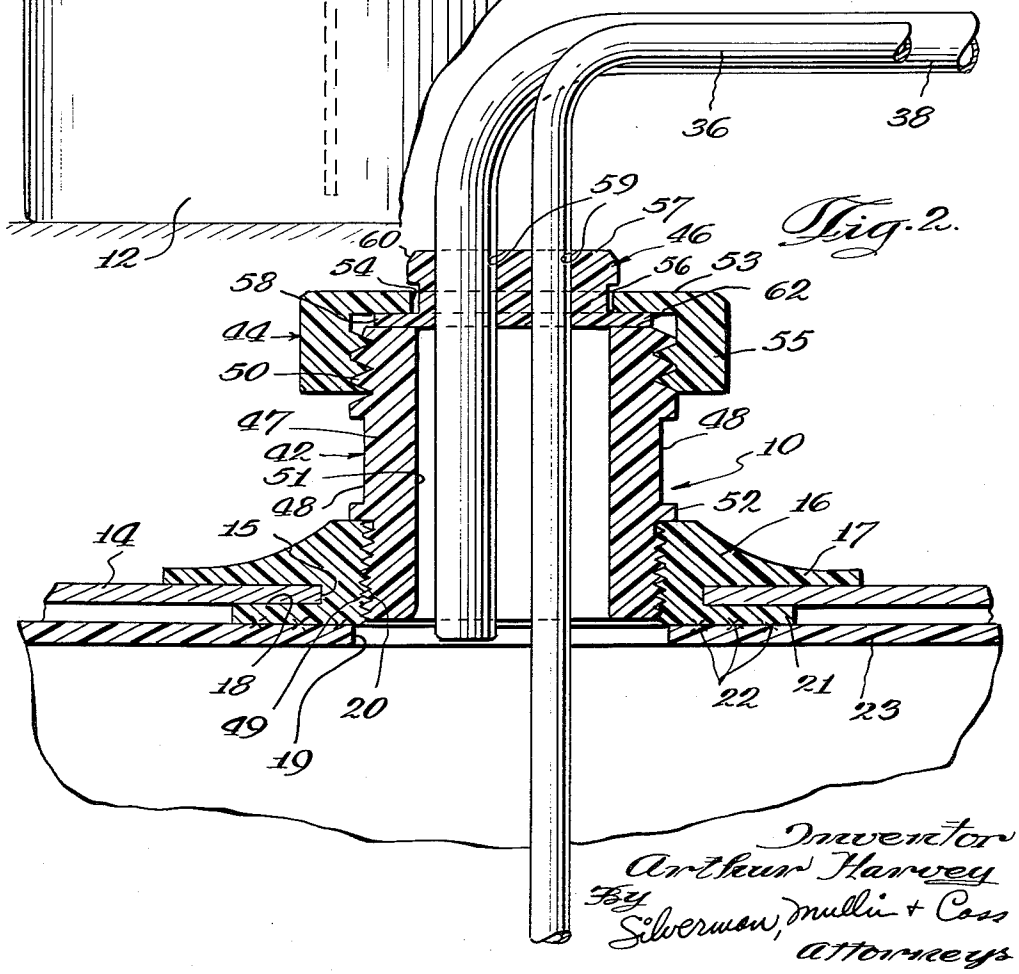


Fig. 2.



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CORROSIVE FLUID CONTAINER FITTING

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7 Claims. (Cl. 222—498)

This invention relates generally to supply systems for corrosive fluids such as acids, ammonia and the like and more specifically, relates to an improved fitting for corrosive fluid containers employed in such systems which enables distinctive advantages to be realized in connection with decoupling of the feed lines from the container and replacement of a depleted container.

Heretofore, considerable difficulty has been encountered in replacement of depleted corrosive fluid containers of such systems, such as employed in connection with certain machines for reproduction of documents, for instance. The feed lines or conduits, usually made of stainless steel, aluminum or the like, were connected to the container, such as a metal drum by means of a fitting which was screwed into a tapped outlet port in a wall of the container, the fitting having appropriate passageways therein through which the conduits were engaged for communication with the interior of the container. In order to replace a container, the fitting was required to be unscrewed and lifted bodily along with the conduits from the outlet port in the container. Since the conduits were relatively rigidly connected in the supply systems, it was difficult to disconnect the same from the container without twisting of the conduits. Such difficulties were additionally complicated because of the corrosive and volatile nature of such ffuids which, by reason of the excessive handling of the conduits and fittings heretofore employed, increased the likelihood of accidents and bodily contact with the corrosive liquid and fumes. Such prior art fittings also were less than satisfactory because of the great care required to tightly engage the same in the outlet port in order to affect a proper seal against escape of fumes.

Accordingly, it is a principal object of the invention to provide a fitting for corrosive fiuid containers which is characterized by a structure which substantially eliminates the disadvantages hereinabove described.

An important object of the invention is to provide a fitting of the character described which includes a novel cap member having a support plug movably supported in a passageway formed in the transversed wall of the cap, said plug adapted to support fluid conduits and having novel sealing means for sealing said passageway against escape of fumes and fluid when the cap member is tightened on the container.

An important object of the invention is to provide a fitting of the character described which includes a novel adapter component which is engaged at one end thereof in the outlet port of the container, and removably engaged at its opposite end with a cap member having movable sealing means which are moved into operable position to seal the container by means of cooperative interaction between the cap member and the adapter component.

Another object of the invention is to provide a fitting of the character described in which said adapter component may be utilized as a standard element capable of being provided on all the containers employed in the

particular system concerned such that removal and replacement of containers may be considerably simplified and expedited merely by proper manipulation of the cap member.

A further object of the invention is to provide a fitting as described in which said sealing means comprises a molded plug component having a loose connection with the cap member, said molded component having longitudinal passageways therethrough for reception of the fluid conduits and a flexible protruding lip adapted to cooperate with wall portions of the cap member for effecting the said seal.

The foregoing and other objects of the invention will become apparent as the description thereof is evolved, a preferred embodiment being described and illustrated in detail to enable the skilled artisan to understand and practice the same. Minor departures from the structural features of the invention are contemplated without circumventing the governing principles or scope of the invention.

In the drawing, wherein the same characters of reference have been employed to designate the same or equivalent parts through the several figures thereof:

FIG. 1 is an elevational view of a conventional supply container or drum for corrosive fluid connected in a system for supplying the fluid, portions of the container being shown in section, and the invention being associated therewith.

FIG. 2 is a median sectional view on an enlarged scale taken longitudinally through the novel fitting embodying the invention as shown installed on the container of FIG. 1.

FIG. 3 is a fragmentary top plan view of the fitting of FIG. 2 with portions broken away to show certain details.

Referring now to FIG. 1 which illustrates a fitting constructed in accordance with the invention which has been connected into a system for supplying corrosive fluid to a photo-reproducing machine or the like, the reference character **10** is used to designate the fitting of the invention generally. The same is shown connected to the supply container or drum **12**, the outside retainer walls of which may be formed of metal or the like and having a top wall **14** which is provided with an opening **15** to provide principal access to the interior of the drum **12**. A gland **16** of non-corrosive material such as polyethylene is secured in the opening **15**, there being an annular groove **18** formed in the gland **16** by reason of relatively large area exterior annular portion **17** which overlies the top of the wall **14** about the opening **15**, and a similar annular interior portion **21** which overlies the bottom of the wall **14** about the opening **15**. These two formations **17** and **21** hold the gland **16** tightly in position.

The formation **21** is welded or otherwise secured at **22** to a non-corrosive envelope **23**, of polyethylene or other suitable material, which has an opening **19** aligned with the threaded passageway **20** of the gland **16** so that the fluid **39** which is normally contained in the envelope or liner **23** may be introduced into or removed from the liner in a manner which is well known. The liner **23** and top wall **14** are usually assembled as a unit and clamped into the interior of the drum **12** through any suitable means such as the annular clamping ring **13** which is illustrated. There is another similarly formed opening in the package which is an air hole and which is blocked by a plug **24**. The opening **20** is generally referred to as

a bung hole and it is closed off by a suitable exteriorly threaded bung (not shown) which is removed to gain access to the contents of the liner **23**.

The construction of the drum and liner and the gland **16** form no part of the invention per se, the structure being substantially conventional and in commercial use at this time. The details thereof are needed in order to emphasize the nature of the fluids which are being handled and as well to show the manner in which the preferred embodiment of the invention is associated with the package. The efforts made to assure substantially gas-tight connections and the precautions taken to prevent the contact between the fluid and the metal from which the exterior container is made all the more emphasize that the problems which have been solved by the invention herein are substantial and unobvious.

Heretofore, the handling of a package of this kind was limited to the removal of the bung and the pouring of the fluid into a tank or the like which was associated with the reproducing machine. In the cases where the container was heavy, siphoning equipment could be used, but in any event, the package was merely a transportation or storage container requiring multiple handling for use. In the case of the invention, the container itself is coupled directly into the system of the machine and this is accomplished merely by removing the fitting **10** from one container and attaching the same to another prepared in advance, as will be seen, by means of an adapter. In the case of containers of other construction, not having female bung-holes, the fitting **10** could be attached without the need for an adapter.

Referring now to the fitting **10**, the same consists of an adapter component **42** and a cap member **44** carrying the sealing means **46**, the cap member **44** and the sealing means **46** primarily cooperating to achieve the advantages of the invention. Each of these components are molded of a suitable non-corrosive material resistant to the fluid, polyethylene being a preferred material.

The adapter member **42** comprises a rigid hollow cylindrical member or tube **47**, which may have medial flattened circumferential areas **48** and is externally threaded at opposite ends **49** and **50** thereof respectively. The adapter **42** has a central passageway or bore **51** therethrough which for purposes of economy is of uniform diameter. The end **49** is suitably dimensioned to permit the member **42** to be screwed into the threaded passageway **20** of the gland **16**, said member **42** having an annular protruding flange **52** comprising stop means spaced from the end face of end **49** to limit the amount the member **42** can be inserted into the gland. The opposite end **50** of said member **42** is adapted to be removably engaged with the cap **44** and the sealing means **46**

The cap **44** includes an annular transverse wall **53** having an annular passageway **54** therein the diameter of which has been illustrated as slightly larger than the diameter of the passageway **51** of adapter **42** although this is not necessary. The side wall **55** of the cap, which may be polygonal in external configuration as seen in FIG. 3, has portions of the inner surfaces thereof suitably threaded to permit the cap to be screwed over the end **50** of adapter **42**. The sealing means **46** is engaged through said passageway **54** and is movable axially therein. Said sealing means comprises a support plug member having an annular body segment **56** the diameter of which is slightly less than the diameter of passageway **54**, an enlarged annular head formation **57** just slightly larger than the passageway **54** integral with one end of the segment **56** and an annular outwardly protruding sealing lip or flange **58** integral with the opposite end of the segment **56**. The diameter of lip or flange **58** is substantially greater than the diameters of passageway **54** and **51**. In the installed position of said sealing means, the head **57** is disposed exterior of wall **53** and flange **58** is disposed on the opposite side of said wall. It will be seen from FIG. 2 that the length of segment **56** is slightly greater than the thickness of transverse wall **53** so that said sealing plug **46** is movable axially in said passageway **54** to a limited extent. The plug **46** has a pair of longitudinally extending parallel passageways through which the conduits **36** and **38** are respectively inserted for communication with the interior of the container through the passageway **51** in the adapter.

As seen from FIG. 2, the diameter of the cap or head formation **57** is only slightly larger than the diameter of opening **54** for a very desirable purpose. In assembling the plug **46** to the cap member **44**, it is possible to push the head **57** past the lip of the opening **54** from the interior of the cap by reason of the limited resiliency of the material forming the transverse wall **53**. To facilitate mounting of the plug **46**, the upper end of the formation **57** may be tapered or beveled as indicated at **60** so that the formation **57** can be pushed through the opening **54** from the interior of the cap and locked in place by the lip or flange **58** and head formation **57**.

The manner in which the advantages of the invention are realized will be described in connection with a replacement operation of the container. We presume that a container **12** having the novel fitting **10** associated therewith has been depleted or exhausted in fluid contents. The operator merely unscrews the cap **44** from the end **50** of the adapted and lifts the cap and the plug **46** supporting the conduits **36** and **38** from the container. A new container is brought into position which either may have an adapter **42** already mounted in the gland **16** thereof or the operator may unscrew the adapter on the depleted container and apply same to the gland of the new container. The cap **44** is then screwed on the end **50** of the adapter of the new container. As the end face **62** of the adapter bears against the lip or flange **58**, said lip is biased or pressed against the underside of the transverse wall **53**. Upon continued taking up on the cap **44**, said lip in cooperation with wall **53** forms a seal around the opening **54** which prevents discharge therethrough of obnoxious fumes or fluid. The seal at opening **54** is maintained throughout the syphoning action by flange **58** since the cap **44** is screwed down tightly on the adapter in engagement with said flange. It will be noted that the plug **46** is free to rotate in the opening **54** relative the cap and hence, when the cap is rotated, the conduits are not twisted.

The invention also contemplates attachment of an adapter **42** to the container in a permanent manner in which case, each container used will have such an adapter installed. Other means for installing the adapter in the outlet port of the container may be considered. Also, it is contemplated that the adapter may be made integral with the cap structure.

In certain types of containers, such as those having an elongate externally threaded neck formation as a part thereof, the adapter may not be necessary. In this event, the same cooperation between the end face of the neck formation and the sealing means of the cap will be realized merely by screwing the cap on the neck formation. Such containers will permit the cap structure of the invention to be used alone. Of course, the threads and size of the cap will be selected to cooperate with that of the neck.

It is believed the invention has been described in sufficient detail to enable the skilled artisan to understand and practice the same. Appended hereto are claims setting forth the invention in particularity as required by the patent laws, it being contemplated the language be construed as broadly as is commensurate with the progress in the arts and sciences contributed thereby.

I claim:

1. In a corrosive fluid supply system including a container having an outlet port and conduit means for withdrawing fluids from the container through said port; a cap structure having adapter means capable of connec-

tion through the port by a rotary movement, said cap structure having an annular side wall and a perforated transverse top wall and sealing means movably mounted in the perforation for movement along a path parallel with the axis of the perforation, said sealing means having support means exterior of the top wall capable of supporting said conduit means in communication with the interior of said container, said sealing means being movable along said path for sealing said perforation when the cap structure is operatively installed on the container, said sealing means comprising an integral plug member having a non-collapsible body member the cross sectional dimension of which is smaller than the size of the perforation, a head formation slightly larger in cross-sectional dimension than said perforation on one end of the body member exterior of the top wall comprising said means capable of supporting the conduit means, and a sealing flange on the body member engaging the opposite side of said transverse wall, said top wall being sufficiently resilient to permit passage of said head formation through said perforation.

2. A fitting adapted to be installed in a corrosive fluid supply system which includes a container having a threaded neck formation provided an outlet port for the container and conduit means for drawing fluid therethrough from the container, said fitting comprising a cap member adapted to be screwed on the neck formation to close off said outlet, said member having a perforated transverse top wall and a non-collapsible sealing plug movably engaged in the perforation having a head formation adjacent the exterior surface of said wall for supporting the plug in said perforation and a sealing flange on the opposite side of said transverse wall adapted to be moved into engagement with said transverse wall to seal said perforation when the cap member is screwed tightly on the neck formation, said sealing plug having a passage therethrough for supporting each of said conduit means in communication with the interior of the container through said neck formation, said head formation being slightly larger than the perforation and having a tapered end, said top wall being sufficiently elastic to permit the head formation to be passed through the perforation from said opposite side of the transverse wall.

3. In a corrosive fluid supply system including a container having an outlet port and conduit means for withdrawing fluids from the container through said port; a cap structure having adapter means capable of connection through the port by a rotary movement, said cap structure having an annular side wall and a perforated transverse top wall and sealing means movably mounted in the perforation for movement along a path parallel with the axis of the perforation, said sealing means having support means exterior of the top wall capable of supporting said conduit means in communication with the interior of the container, said sealing means being movable along said path for sealing said perforation with the cap structure is operably installed on the container, said sealing means comprising a plug member having a non-collapsible body member the cross-sectional dimension of which is smaller than the size of the perforation, a head formation on one end of the body member exterior of the top wall comprising said means capable of supporting the conduit means, and a sealing flange on the body member engaging the opposite side of said transverse wall, said head formation being slightly larger in cross-sectional area than the cross-sectional area of said perforation, said transverse wall being sufficiently resilient to permit passage of the head formation through the perforation, said head formation having means capable of facilitating installation of the plug member in the perforation from the interior of the cap structure.

4. A fitting adapted to be installed in a corrosive fluid supply system which includes a container having a threaded neck formation providing an outlet port for the container, and conduit means for drawing fluid therethrough from the container; said fitting comprising, a cap member adapted to be screwed on the neck formation, said cap member having a perforated, transverse top wall, and a non-collapsible plug movably engaged in the perforation for movement substantially perpendicular to the transverse wall, said plug having a head formation integral with one end thereof and adjacent the exterior surface of the transverse wall for supporting the plug in said perforation and a sealing flange integral with the opposite end thereof and on the opposite side of the transverse wall, said head formation being slightly larger than said perforation, said sealing flange being movable into engagement with the transverse wall so as to seal said perforation when the cap member is screwed tightly on the neck formation, said sealing plug having a passageway therethrough for supporting each of said conduit means in communication with the interior of the container through said neck formation, said top wall being sufficiently resilient to permit passage of the head formation therethrough, albeit, rigid enough to support said plug in the perforation.

5. A fitting as described in claim 4 in which said plug has a body portion intermediate said head formation and sealing flange which is longer than the thickness of said transverse wall and smaller in cross-sectional size than said perforation whereby the plug is both freely rotatable and linearly movable in said perforation relative to the transverse wall prior to installation of the cap member, and said head formation has a tapered end which facilitates passage of the head formation through said perforation from said opposite side of the transverse wall.

6. A fitting adapted to be installed in a corrosive fluid supply system which includes a container having a tapped outlet port and conduit means for passing fluid therethrough from said container; said fitting comprising, an elongate adapter member having screw threads at one end thereof for connecting the adapter member to said outlet port, said adapter member having a bore therethrough, a cap member removably secured on the opposite end of the adapter member, said cap member having a transverse top wall provided with an opening aligned with said bore, sealing means linearly and rotatably movable in said opening, said sealing means having an enlarged planar portion at one end thereof engageable with the exterior surface of said transverse wall for supporting the sealing means in said opening, said sealing means having means for supporting said conduit means in communication with the container through said bore and outlet, said adapter member having an end face at the opposite end thereof adapted to bear against said sealing means in the installed position of the fitting and maintain said sealing means engaged against said transverse wall to seal said opening.

7. In a corrosive fluid supply system including a container having an outlet port and conduit means for withdrawing fluid from the container through said port; a cap structure having adapter means capable of connection to the port by a rotary movement, said cap structure including a cap member having a transverse, perforated top wall and an annular skirt depending from said top wall adapted to be secured on the opposite end of said adapter, sealing means supported on said top wall and movable linearly within said perforation, said sealing means comprising a substantially cylindrical, rigid body smaller in diameter than said perforation and longer than the thickness of said wall, said body having an enlarged support formation integral with one end thereof exterior of the top wall capable of supporting said conduit means in communication with the interior of the container, and a sealing flange integral with the opposite end of said body movable to engage against the interior surface of said wall for sealing said perforation when the cap member is secured on the adapter member, said adapter member adapted to bear against said sealing flange to move same into sealing en-

gagement with said wall when the cap member is secured on the adapter member.

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